

Involvement of ingredients suppliers in new products development in the soft drinks industry

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Abstract: The ability to introduce new products on the market is considered an important factor of competitiveness. The increasing importance of this ability derives from the need for new products to be offered with greater frequency to meet consumer expectations. This is the reality of the food industry, which must offer an ever greater product diversity to satisfy functional specifications and market segments. The purpose of this paper is to shed further light on supplier involvement in the product development process and in the improved quality of processed food and soft drinks. This involvement encourages cost reductions and shorter lead-times in the process of new product development projects by providing supplier access to food technologies and their applications. The theoretical approach of this study comprises two models: the new products development process, and supply chain management. A theoretical review serves as the basis for an analysis of supplier integration into the supply of materials and components for the industrial customer. This study was conducted at two companies operating in the nonalcoholic beverages segment (powdered refreshments). The choice fell on this segment due to its strong demand for product growth and to the diversity of new products resulting from their convenience (comfort). This survey focused on an analysis of the relationship between ingredients suppliers and beverage manufacturers in the new products development process.

Keywords: new products development, ingredients suppliers, soft drinks industry, supplier involvement in product development

1. Introduction

The management of products development process presents a complex structure, due to several factors from its dynamic nature. For instance, it requests big interaction with other areas of the company and deals with a large range and quantity of information from peculiar sources manipulated along that process. The dynamic nature is related to the interactive cycle of design-build-test, involving constant project revisions during the development process phases. In this sense dealing with these factors that complicate the perception of this process represents a big managerial challenge (AMARAL, 1997).

The factors that interfere in the product development process, according to the literature, are: leadership; projects' organizational structure; product concept; suppliers and clients involvement (CLARK & FUJIMOTO, 1991; BROWN & EISENHARDT, 1995). A highlight factor, also being the focus of this work, is the participation of suppliers in this process (CLARK & FUJIMOTO, 1991; HARTLEY et al., 1997; RAGATZ et al., 1997).

One of the strategic decisions related to the product development process (PDP) is how the inputs and components of the products will be developed and supplied. In this matter, the set of options are: to take advantage of physical resources available from others products by the same company; to develop internally the inputs; or to delegate the development responsibility for the supplier.

The last option is connected to a broader context of relationship between client and supplier and, at last, to the company's insertion in supply chains (AMARAL, 1997). The suppliers' competence becomes important to the product differentiation within the context of an inter-organizational net. From this scope, the efficiency in performance is seen as group-oriented rather than an individual action (FLEURY & FLEURY, 2003). For that matter, the structure of the supply chain should favor the existence of shared decisions on process concerned with supplying operations. The make or buy decision for components, combined with the development of relationships with suppliers, are important aspects of the products development process (SOBRAL, 2003).

2. Objective and methodology

The objective of this work is to analyze the industrial relation between the ingredients suppliers and the non-alcoholic beverages industry – powdered soft drinks segment – focusing the initiatives for sharing actions in the new product development stream.

By following YIN's (1994) orientation and targeting the main objective of this article, the case study method has been chosen as the most adequate for this research program, because of the specific type of questions proposed, the extent to which effective

contemporary events are controlled and how the research sheds light to these events.

In this multi-case study, an exploratory research with a qualitative approach takes place to observe all related phenomena in its own habitats, comprehending how the unit of analysis works out as a process by identifying and correlating its dynamic aspects (BRYMAN, 1990).

The importance of the proposed working methodology is sustained due to lack of previous researches underpinning the food industry segment, especially in Brazil. This work aims to investigate the degree of ingredients suppliers participation into the product development process within the food industry's powdered soft drinks segment. The exploratory phase will be guided by the specialized literature review (books, scientific journals, articles, theses and others) focusing on the identification of parameters and critical functions to explain the role played by suppliers during the product development process.

The multiple case analyses, in comparison to a single case study, establish more robust results than the single one (YIN, 1994). For that matter, this working paper presents two case studies from the powdered soft drinks' segment. Data was collected through visits *in loco* with the application of semi-structured questionnaires within the selected companies during the interviews.

3. Bibliography revision

3.1. Food industry

Historically, the food industry, in world scope, was structured for the internal market. It was characterized by a strong presence of small and medium companies (MIZUTA, 2000). Since the decade of 20, the sector has been dealing with companies-fusion process not only at the sector of industrial processing, but also in the retail trade. By the end of the Second World War, the enlargement of the leaders companies market had been favored by marketing/advertising.

The companies fusions strategy has the objective to increase the action area, by decentralizing and spreading world wide the production units. Another aspect of this strategy is related to product differentiation by the diversification of production lines. In Brazil, this process was intensified during the decades of 1980 and 1990, followed by its economic desregulation, industrial's productive globalization and market diversification. In response to the variations occurred in that competitive environment, fusions with private characteristics occurred like, for example, companies leaders of others sectors extending their business to the food branch. Companies started to adopt agile and flexible organizational models and strategies directed to product and services differentiation to specific segments of markets (LOIOLA, 1998; FARINA, 1992; ASSUMPÇÃO, 2003).

3.1.1. Powdered soft drink

The powdered soft drinks – being brazilians low budget home consumption substitute for the soft drinks (soda) – has strong expectations to increase its participation in the non alcoholic beverages market segment. This market transacts more than R\$ 12 billions yearly in Brazil, from soft drinks and tea to mineral waters. The powdered soft drinks demand is represented by schools, industrial restaurants and brazilian country side homes. These juices, in its light and diet versions, attend to more sophisticated segments of consumers, substituting soft drinks (soda) and natural juices, due to the convenience of its easy elaboration (FRANCO, 2002). By the year 2000, brazilians had consumed 1,698 billion liters of powdered soft drink, transacting around R\$ 427 millions, according to AC Nielsen data. In 2001 the consumption reached 1,8 billion liters, generating

R\$ 490 millions (AMCHAM, 2002). In 2002, the powdered soft drink consumption presented a growth of 8% (CORREA, 2003).

3.1.2. P&D activities in the food industry

The intensification of technological transferences between chemical and pharmaceutical sectors to the food industry narrows the relationships amongst big companies from these segments, heading toward the process reconfiguration in the supply net to the food industry. MARTINELLI (1999) observes the deepening of the work's division in the productive chain with firms specializing for generic ingredients supplying, extracted from refineries of first processing (sugar, flour, salt, cocoa) and of specific ingredients (additives) companies production of final food processed and of catering-systems. Companies such as Cargill, Ferruzzi / Bèghin-Say, Tate&Lyle, ADM, Unilever – all of which are food producers – extended their geographical actions toward the production of generic intermediate ingredients and, more intensely, in the output of specific ingredients (acid, fatnesses, flavor, artificial sweeteners and other), obtained in second or third processing by chemical or biochemical process. In Brazil, these companies become associated with companies from the sugaralcohol sector to produce citric acid and other ingredients (ALVES & RIBEIRO, 2001). Other Japanese capital companies (Ajinomoto and Kirin Brewery) are also associated with Brazilians sugar and alcohol factories, looking forward to produce monosodium glutamate and RNA salt (ribonucleic acid). Therefore, the food industry has its innovations and technical progress strongly linked to other industrial segments, confirming its own characteristic of "sector innovations runner", thus being very intensive in production scale.

The sectors that are detached as suppliers of food technology are the chemistry and the pharmaceutical for the production of specific ingredients and capital goods (machines, equipment). Also for the modernization of its technological productive process, such as the petrochemical (PET packaged), with innovation in the packaging and in the logistic of the product (ASSUMPÇÃO & BIANCHINI, 2003). The food industry's productivity rate grows to the resemblance of others, although its relative expenses on P&D are substantially smaller (CONNOR, 1985).

3.2. Product development as a process

The new product development process has its focus on attending market's demands. By then, the objective is to launch products that attend to the attributes related to quality, with development on time and reasonable costs, quicker than concurrents's actions. Beyond that, it is also necessary to assure the manufacturability of the developed product, in other words, its manufactory facility attending to cost and quality restraints (FLORENZANO, 1999). The way how the company realizes the development of products, its speed, efficiency and quality of work, will define its product's competitiveness the market (CLARK & FUJIMOTO, 1991). Product development has its base settled in the concept extracted from the knowledge about market dynamics, from process feasibility for its production and from information flow among the different phases of development with feedback loops for adequation of product's project, according to its concept and economic and technical feasibility. The product development process must, in this way, permit the highlighting of one or all activities of the organization, seeking functional and inter-organizational integration for company's efficient performance (DAVENPORT, 1994).

It is essential to keep up the process in which the informations are generated, transmitted and used to identify the critical connections inside and within the organization and the market, allowing

the identification of key aspects for the product development in a competitive environments. Beyond that, the knowledge of development as a business process makes possible an broad and dynamic scope for the product development, allowing company's interaction and self-feeding with the external environment (CLARK & FUJIMOTO, 1991).

The Figure 1 presents the product development process inside the environment of the company and its relation with suppliers. According to CLARK & FUJIMOTO (1991), the consumption process includes product's related distribution, information and services and its use by consumers. These informations are generated from marketing and product's characteristics, considering its performance in the market and the experiences and needs of the consumers. The product development process feeds the manufacture project process with informations, which then leads to pilot scale test, resulting in the production in commercial scale. The supply process interacts with the informations about product and process requirements, being responsible for supplying production resources and materials for the manufacturing unit. Therefore, suppliers integration with the industrial client takes place, nonetheless, by supplying physical resources, but also by means of technical assistance and colaboration in the development activities (AMARAL, 1997).

3.2.1. New products development

The new products development is a complex process, which can be broken down in phases as proposed in the CLARK & WHELLWRIGHT's model.

CLARK & WHELLWRIGHT (1993) defined the typical phases of the product development as:

- Concept development: architecture of product, conceptual model, target market;
- Product planning: model building, small-scale testing, invest-ment/ financial;
- Product/ Process Engineering: Detailed desing of product and tools/ equipment, building/ testing prototypes;

- Pilot production/start up of commercial production: volume production prove out, factory start up, volume increases to commercial targets.

3.2.2. Suppliers and the products development process

The quality of product's project is straightly influenced by company's innovation capacity, as well as by its knowledge about the consumer needs. The suppliers, in their turn, can adopt an important role creating or transferring technology for their client, being a new component incorporation to help the architecture of the final product development (TOLEDO, 1994).

The interaction degree between supplier and industrial client depends on project's size, scope and complexity, as well as the degree of technological intensity incorporated to the supplied input (AMARAL, 1997). The Figure 2 presents the possible points of supplier's interaction with the product development process (PDP).

According to HOOD et. al (1995), the ingredients suppliers for the food industry can act in the new products development for their clients following several forms as indicates the Table 1, characterizing differents kinds of suppliers.

The analysis of suppliers kinds, according to their action in the product development process, is considered as the classification that analyzes the supplier-client integration at the automotive sector. This classification was elaborated based on a broad study among the world-class Japanese assemblies and adopted by KAMATH & LIKER (1994). This consideration takes place because there is not enough knowledge about the present period of training of relationship's practices between Brazilian food industry and its suppliers. The presentation above advances some hypotheses about what will be observed in the supplier-industrial client relation at the segment of beverages. Suppliers divide themselves in four categories:

- *Partners*: develop entire subsystems and are coooperative during the phase of product specification (concept). *For the food industry, this kind of partner may be characterized as the one that supplies pre-prepared used in the formulation of products.*

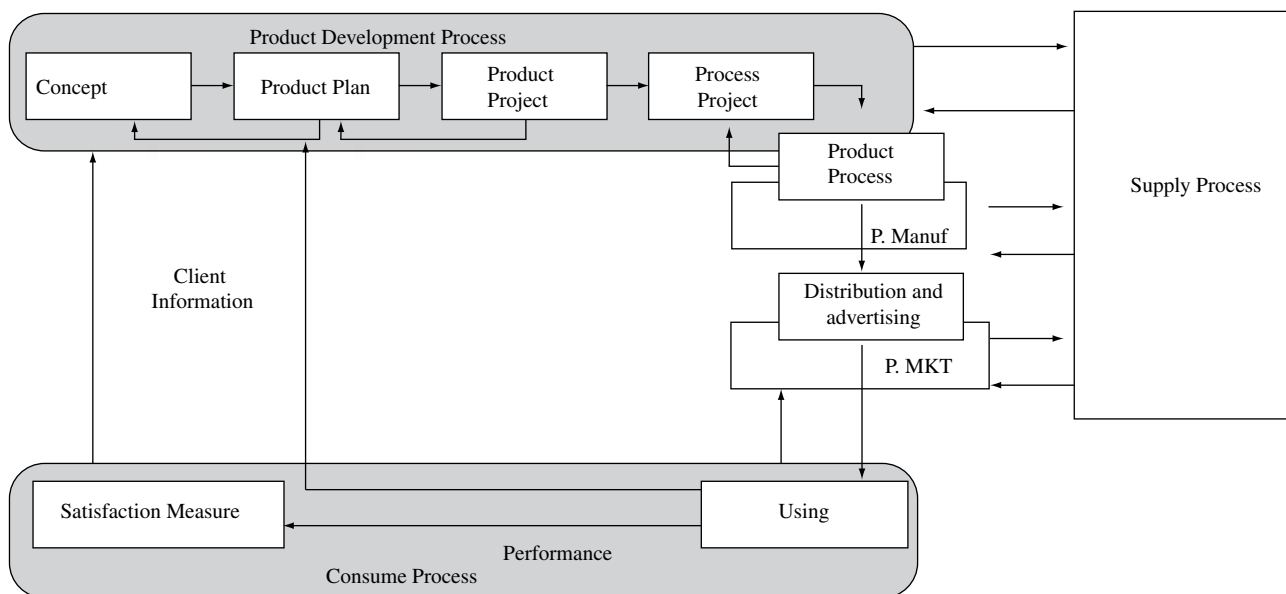


Figure 1. Information flow in the product development process (CLARK & FUJIMOTO, 1991).

Table 1. Kinds of the supplier Technical Assistance for the industrial client (HOOD et al., 1995).

Product Development Process (PDP)					
Technical Assistance	1. Concept	2. Product Planning	3. Product engineering	4. Process Planning	5. Production
	Ideas generation	Idea selection	Feasibility testing	Engineering/equipment design	Prototype development
	Risks avalaliation		Product development	Processing aids	Commercialization
	Product formulation		Product shelf life	Process engineering	Marketing and/or advertising support
	Ingredient sourcing		Regulatory implications		Sensory testing
	Field audits		Tolerance testing		
		Quality improvement			

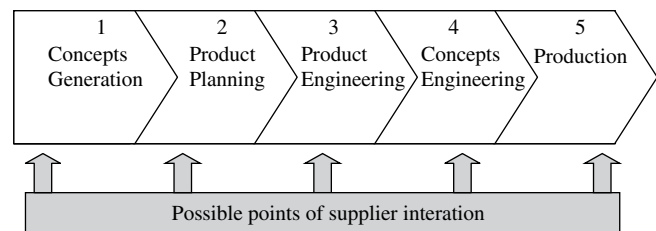


Figure 2. Suppliers Integration with the Product Development Process (HANDFIELD et al., 1999).

- *Mature suppliers:* similar to partners, also projects complex subsystems. However, they receive critical specifications already done by their clients. *For the food industry, might be the supplier that attends the specifications defined by the industrial client for preparing the ingredients mix according to previous determined characteristics;*
- *Child suppliers:* develop simple components, according to clients detailed specifications. *It might be the supplier that produces one ordered ingredient according to client's specifications; and*
- *Contractual suppliers:* develop and manufactures standard products that can be bought by catalogue. *They could be the distributors of specific ingredients (additives).*

4. Results

4.1. Companies characterization

The companies that were analyzed are of national capital structure and are situated in the São Paulo State, Brazil.

- **Company A:** Has a plant located in Itu, with 100 employees. Its product lines includes powdered soft drinks, chocolate powder, gelatin, and soup. It has 3 to 4% of the Brazilian market of powdered soft drinks.
- **Company B:** Has 17% of powdered soft drink's national market. This company focuses on the popular market for powdered soft drinks, competing for low price with traditional basic products. In the case of chewing gums, it attends to specific segments of the market. It has 338 employees distributed in four plants located in Bauru. The Table 2 presents these units with respective relative invoicing.

4.2. Product development process

The product development process in all three companies studied follows the same sequence of phases and activities: concept

Table 2. Plant Unit x Company B Invoicing.

Product Unit	% Invoicing
1. Powdered soft drink	50
2. Chewing gum	40
3. Candles	10
4. Ingredients	

generation, product planning, product project, product evaluation and line testing. The companies Board of Management and their areas of Marketing and Sales are responsible for the image product conception. While Sales area identifies the market demands, Marketing works with the generation of ideas for attending that demand. The approval of the project, however, depends on the companies Board of Management that evaluates the necessary investments, the perspectives of market and the impact of this new product in the company general strategy, keeping surveillance on the pattern of actions of the concurrents and the economic situation of the country. The laboratory (development team) is responsible for the product project activity, determining project specifications and carrying out the formulation tests.

- **Company A:** The development team is composed by the marketing and development manager and by more three chemistry technicians. The size of this team is considered small, nevertheless, the company has medium port and possesses small range of products. The company develops projects of powdered soft drinks, belonging to stretched lines category, mainly with alteration of flavor. According to FULLER (1994), stretched lines represents derivative products, in other words, new variations of a product line already established. This kind of innovation in product presents: low development time; few changes in the production line and in the strategy of market; and also in the way of working with new input resources. The project's evaluation, that occurs in the phase of product planning, is carried out by the marketing and development manager, responsible for the study of economic feasibility. The average time for their powdered soft drinks' development varies from one to two months.
- **Company B:** Eventhough this company also has a small P&D laboratory team, composed by two staffs (technicians in chemistry) it presents constant renewal of their products. Whether that be for stretched line projects or reformulation of existing products. According to FULLER (1994), by reformulation of existing products one should comprehend it as the modification on the product formulation, wheter in the color,

flavor, composition, stability or in others aspects. Generally, that reformulation is performed at low costs and in with low development time. The reasons why to change the formulation can be: market special demands, absence and/or enclosure of raw material, reduction of cost and creation of new market niches. In the case of powdered soft drinks, the launching of new products follows the leader of the market. The average time to develop a new product is about 30 days.

4.3. Involvement of suppliers in the PDP

The involvement and action of suppliers in the development of products occurs with all analyzed cases. It occurs, mainly, in the generation of the concept and in the project of the product, however on differentiated ways. All of the raw-materials for powdered soft drinks are acquired from suppliers, with only one input exception: fumaric acid by the company B.

In the concept generation, the ingredients suppliers helpout by suggestioning ideas, formulating products and pointing new ingredients. In the case of product formulation, the sweetness suppliers have got greater participation within the both companies.

In relation to the product project, it has been verified that the fragrances suppliers exercises a fundamental role in the PDP. The company indicates the attributes desired for the suppliers and this last one develops pre-prepared to attend those attributes. The action of sugar (generic ingredient) suppliers in the PDP is related to input supplying with a specified granulometric choice by the company. The other ingredients, such as acid bases, stabilizers, sweetness and others, comes from standardized product suppliers that sells through catalogues.

- **Company A:** The interaction with suppliers is more receptive in the generation of ideas. The company accepts suggestions for their new products by the suppliers. The company is not concerned with the suppression of suppliers, instead, seeks a long-term relationship with them.
- **Company B:** The interaction with suppliers is the most proactive. The company pre-stabilishes the conditions that the suppliers should accomplish. For each year the company selects their suppliers, on the basis of the technical qualification and capacity of supplying products inside a break of price stipulated. The company produces fumaric acid. The make or buy decision was based on two points. First, the existence of a unique supplier in Brazil used to complicate supplying, with the imposition of conditions from inherent characteristic of the company B's products demand. This imposed the necessity to import acid fumárico. Second, however, due to monetary exchange variations, the importing of the product turned out to be impossible, in face of budgetary planning difficulties and also by the mechanisms of price imposition for this input.

5. Final considerations

The ingredients suppliers for powdered soft drinks can be classified as the following:

- The fragrances suppliers are considered partners, therefore the companies determine which fragrance is desired, to be developed. These suppliers play a fundamental role in the PDP, since they can determine how long will it take to develop the product project;
- The sugar suppliers are considered child supplier, since they produce the sugar with the specified granulometric requested by the client; and

- The other ingredients suppliers are considered hired by contractual suppliers, therefore offering standardized products, been bought through catalogues.

The choice is made between these suppliers by means of price and quality inputs' analysis. The supplying relationships for Company A are long-terms type; for Company B are annual type (being settled by contractual relations).

By the analysis of the cases, this work is able to indicate that the ingredients suppliers contribute to the product development process. The companies declared that this interaction boosts the reduction of developments' time and cost, if the product project work is done together with the suppliers. The time economy on this development results from the coexistence of joint development work within companies and suppliers. Lower costs result from shared efforts on the development and mitigation of doubled work, once the interaction along de process exists.

Company B can be considered the most pro-active amongst the suppliers, determining the supplying conditions for its inputs, under the technological and economical domains. Company B selects its suppliers for each year. It also chooses the suppliers by going beyond specifications and technical characteristics (product briefings). It presents a half-time to determine prices for the raw-materials used in their products.

Companies A is more receptive to suppliers' contribution, by respecting suggestions aiming toward the generation of ideas for their new products. Company A trusts the development of pre-prepared to their suppliers, when the attributes desired are informed, without the presentation of technical specifications.

The industrial relation between the ingredients suppliers and the industry of non-alcoholic beverages on the powdered soft drinks segment, facilitates new product developments by sharing actions within the parties. Suppliers stream of action with company A occurs, mainly, during the product concept's generation phase (formulation of pre-prepared and indication of new ingredients) and in the product's engineering (product development and quality improvement). This suppliers partnership also takes place at the industrial relation with Company B with the difference that it is carried out under directive of the powdered soft drink producer. Likewise, the interaction/sinergy with suppliers facilitates the access and application of food technology into the development of processed food and beverages.

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